



A BUSINESS GUIDE TO

POLLUTION Prevention

HOW TO

LOWER
OPERATING COSTS

PROVIDE
SAFER CONDITIONS
FOR WORKERS

REDUCE COSTS
OF COMPLIANCE

INCREASE
PRODUCTIVITY

PROTECT
THE ENVIRONMENT

REDUCE EXPOSURE
TO FUTURE LIABILITY

ALLOW FOR
QUALITY IMPROVEMENT

IMPROVE
YOUR COMPANY'S
PUBLIC IMAGE





A BUSINESS GUIDE TO

POLLUTION
Prevention



STATE OF IDAHO
IDAHO DIVISION OF ENVIRONMENTAL QUALITY
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FORWARD

A Business Guide to Pollution Prevention was prepared by the Idaho Division of Environmental Quality to help businesses reduce the amount of waste they produce. This manual is designed to provide technical assistance to Idaho businesses seeking ways to reduce all types of waste — including hazardous waste, air emissions, water discharges, and solid waste — whether regulated or not. It is also designed to help identify opportunities to conserve resources such as energy and water.

This guide is intended as a tool business managers and their employees can use to:

- understand the benefits of pollution prevention;
- learn how to put together a pollution prevention program; and
- know who to call for assistance.

You are in the best position to judge how to develop a program that will fit your situation. We have addressed the basic steps of developing a pollution prevention program. The true success of your efforts will be determined by the extent to which the program is incorporated into the way you do business.

This manual is not intended to be used for environmental compliance. Regulatory compliance information can be obtained from the DEQ offices listed in Appendix A.





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U.S. Environmental Protection Agency, Office of Research and Development for *Facility Pollution Prevention Guide*, May 1992.

Washington Department of Ecology, Waste Reduction, Recycling and Litter Control Program for *Waste Reduction in Your Business*, February 1991.

Illinois Hazardous Waste Research and Information Center for *Pollution Prevention: A Guide to Program Implementation*, February 1993.

The efforts of these organizations, and other pollution prevention programs which have produced similar documents, made it possible for us to create this manual for Idaho businesses.



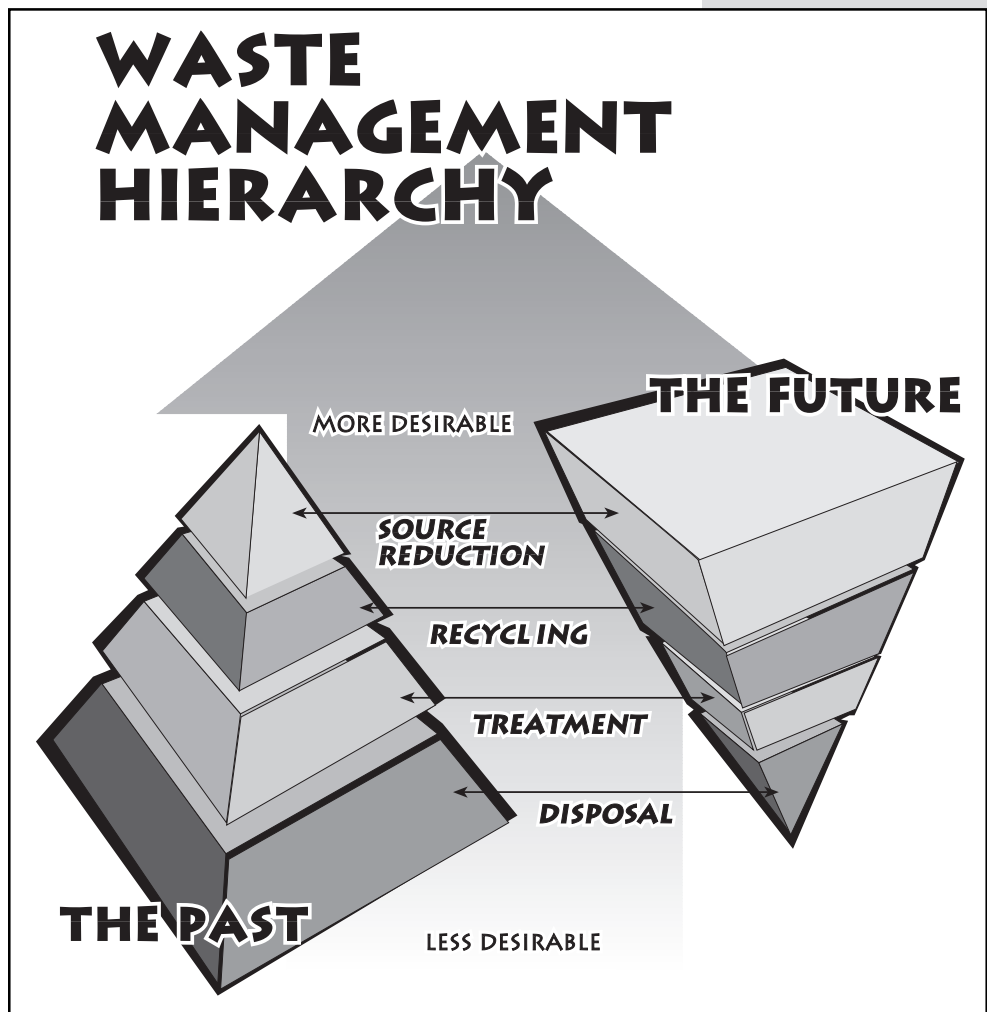
CHAPTER 1

WHAT IS POLLUTION PREVENTION?

Pollution prevention is any activity, including the use of materials, processes, or practices, which reduces or eliminates the creation of pollutants or wastes at the source. Pollution prevention changes the traditional approach to environmental protection. Instead of trying to control the wastes once they have been generated, pollution prevention aims to prevent the initial generation of wastes. The result is reduced volumes and/or reduced toxicity of generated waste. Other terms have been used for this general concept, such as “waste minimization,” “waste reduction,” and “source reduction.” Whatever the term, the object is to move from the management of wastes to the management of the source of waste.

The Pollution Prevention Act of 1990 and the policies of the U.S. Environmental Protection Agency define a specific waste management hierarchy. Source reduction is at the top as the most preferred option. Next is recycling, then treatment, and finally disposal. The aim is to move as far as you can up the hierarchy.

Managing or treating wastes for disposal is not considered pollution prevention, since the waste already exists. Pollution PREVENTION does not focus on technology for treating wastes, but rather on the entire production process, beginning with selection





of raw materials. This approach means searching at each step of production for ways to ensure more efficient use of raw materials so less waste is created. It means stepping back, looking at each step with a fresh eye, and trying to find ways to PREVENT wastes from being generated.

IS PREVENTING POLLUTION THE SAME AS POLLUTION PREVENTION?

Which of the situations below describes pollution prevention?

A. Gene, of Gene's Auto Repair, spilled hazardous solvent from his parts washer during routine maintenance. He immediately placed booms around the spill to prevent the material from entering the floor drain connected to the sewer system.

B. Joe, of Joe's Auto Repair, evaluated his waste generation and decided to replace three parts washers containing hazardous solvent with a hot-water parts washer which generated no hazardous waste.

If you chose b, you were right. While we applaud Gene for preventing the solvent from entering the sewer, he failed to take steps to reduce the volume or toxicity of the **source** of the waste. Joe, on the other hand, had taken steps to reduce the toxicity of his waste. If Joe has a spill, the threat to the environment will not be as high. This example shows that preventing pollution, although a good idea, is not always pollution prevention.

So, how does a business get started on a program to prevent pollution? The following chapters will show you. Each chapter in this manual builds on the previous chapter; it's best to read through the manual once, then go back through as you set up your individual program. Forms are provided at the end of the chapters to help you organize information. Additional resources are found in Appendix A. *~*



CHAPTER 2

WHAT'S IN IT FOR US?

Good business decisions result from carefully evaluating the benefits and drawbacks of any given situation. Pollution prevention activities should be evaluated in the same way. Benefits and drawbacks should be reviewed thoroughly before any course of action is taken.

Pollution prevention often is called “business planning with environmental benefits.” There are, however, more benefits to preventing pollution than just environmental protection.

BENEFITS

► **Lower Operating Costs** — Pollution prevention activities usually save money for a company over time. Many pollution prevention projects have substantial returns on investment, as well as short payback periods. Money usually is saved in disposal costs, new material costs, and improved operating efficiency.

► **Safer Conditions for Workers** — Using fewer toxics in the workplace is a major part of pollution prevention. By reducing or eliminating the use of toxics, a company can improve the safety of the work environment, as well as decrease the requirements for personal protective equipment. The reduced likelihood of leaks, spills, and releases results in less worker, visitor, and contractor exposure. Improving worker safety means achieving better labor relations and can lower insurance rates.

► **Reduced Costs of Compliance** — Pollution prevention projects sometimes eliminate a company's need for permits, manifesting, monitoring, and reporting. Keeping up with regulatory requirements, such as required reports, is time-consuming. Eliminating these requirements will save a company money.

► **Increased Productivity** — Pollution prevention can improve plant productivity by increasing the efficient use of raw materials. Many plants producing large quantities of waste may be using old technologies or may have processes that are poorly controlled and inefficiently operated. Routine maintenance can reduce loss of raw materials through leaks and spills, and often a small improvement can result in increased product yield and better quality.

► **Better Protection of the Environment** — Pollution prevention reduces the volume and/or toxicity of wastes at the source. This reduces the threat to the environment during subsequent management of the waste or from an accidental spill.

► **Reduced Future Liability** — Companies are very concerned about long-term liability from waste disposal. Pollution prevention can reduce your business's liability for environmental problems resulting from recycling, treatment, storage, and disposal, whether at your site or at an off-site facility.





► **Quality Improvement** — A successful pollution prevention program can be an important part of a company's continuous improvement or total quality management program. Reduced waste and improved efficiency are at the core of pollution prevention.

► **Public Image** — Improved employee morale and demonstration of the company's concern for the environment through implementing a pollution prevention program can improve the public's view of the company.

DRAWBACKS

► **Capital** — Pollution prevention measures sometimes require investment of capital. These projects have to be justified economically as well as environmentally. Dollars may be needed for other business activities.

► **Specifications** — Specifications can both help and get in the way. For example, government contract specifications may designate certain materials to use in making a product. This can lead to using materials that are damaging to the environment when less toxic materials would work.

► **Regulations** — It may be necessary to get a new or modified permit before carrying out a change in process or in raw materials. This can cost a company time and money.

► **Product Quality** — Companies care a lot about the quality of the products they make. Pollution prevention projects should be evaluated thoroughly to ensure product quality does not suffer.

► **Customer Perception** — Customers ultimately define product quality — their perception *is* the reality. This should be considered when implementing pollution prevention projects.


► **Immediate Production** — Time, money, and personnel often are required to carry out a pollution prevention project. These resources are taken away from other activities that directly produce profits.

► **Image** — Image is a sensitive issue in any business. Even if exploring pollution prevention options shows that an "old" way of doing business is less than desirable, the company may be reluctant to acknowledge the fact for fear of creating negative public reaction.

► **Resistance to Change** — In business, people are reluctant to change a system that is in place and working. Many claim, "If it ain't broke...don't fix it."

► **Time and Expertise** — Many businesses are strapped just taking care of day-to-day matters. They may not have the time or staff to tackle new, sometimes complicated, pollution prevention practices.

The goal of a pollution prevention program is to reduce the generation of all wastes to an absolute minimum. Recognizing the benefits will help sell the program. Acknowledging possible drawbacks will help to overcome them.

The following chapters will help you put together your pollution prevention program. 

CHAPTER 3

HOW DO WE GET STARTED?

When a company decides to take on a pollution prevention program, specific steps can be followed to help make sure the program succeeds. These steps are:

- Step 1. Get Support** — Get the support of top management in creating a pollution prevention policy.
- Step 2. Develop a Program** — Develop your pollution prevention program by designating a coordinator, putting together a pollution prevention team, writing a pollution prevention plan, and involving employees.
- Step 3. Assess Wastes** — Assess the wastes generated by your business; gather background information and tour the facility.
- Step 4. Identify Opportunities** — Identify opportunities to prevent pollution then set priorities, brainstorm, and document findings.
- Step 5. Rank Opportunities** — Rank pollution prevention opportunities by identifying benefits and evaluating technical and economic feasibility.
- Step 6. Implement Projects** — Try out some pollution prevention projects.
- Step 7. Evaluate Projects and Program** — Evaluate specific pollution prevention projects and the whole program.
- Step 8. Maintain Program** — Keep it going! Maintain the pollution prevention program so it will continue to grow and benefit the company. Congratulate yourself and staff on successful pollution prevention efforts.

A pollution prevention program is never finished, rather it is an ongoing and integral part of the way you do business.



Now, let's look at each step in more detail.

STEP 1 — GET TOP MANAGEMENT SUPPORT AND DEVELOP A POLICY

Top management support is needed to get a pollution prevention program started, to incorporate it into existing activities, and to keep it going. Draft a brief written policy statement supporting a pollution prevention program. If putting together a company-wide policy is too unwieldy, try using an interim or department policy. This gets the process started.

To get support for a pollution prevention program from all levels of management, highlight information on the benefits to the company, such as:

- money savings through reduced use of raw materials;
- money savings through reduced costs of handling, storing, transporting, and disposing wastes;
- increased productivity;
- improved product quality;
- improved worker health and safety;
- reduced liabilities;
- compliance with regulations;
- improved public image; and
- successes enjoyed by companies that have tried such a program.

Ongoing management support will be critical for the success of the program. Time, staff, and dollars will have to be reallocated. It will be crucial for management to recognize the potential gains of the program. Remember to stress the long-term benefits to the company.

The pollution prevention program needs to be viewed by all personnel as “the way we do business.” It doesn’t have to be a new program; it can be incorporated into a total quality management program or built upon existing worker health and safety programs.

Following are some examples of pollution prevention policies that might be used. Distribute copies of the policy to all employees and post them in prominent locations.

EXAMPLE 1

We, (Company Name), are committed to excellence and leadership in protecting the environment. In keeping with this policy, our objective is to reduce waste generation and emissions. We strive to reduce adverse effects on the air, water, and land, through excellence in pollution prevention. By successfully preventing pollution at its source, we can achieve cost savings, increase operational efficiencies, improve the quality of our products and services, and maintain a safe and healthy workplace for our employees.

EXAMPLE 2

At (Company Name), protecting the environment is a high priority. We pledge to eliminate or reduce, wherever possible: (1) our use of toxic substances; (2) our release of toxic pollutants; and (3) our generation of hazardous and other wastes.

When use of toxic substances, generation of wastes, or releases cannot be avoided, we are committed to reducing any undesirable impacts on the air, water, and land.

EXAMPLE 3

(Company's Name)'s environmental guidelines include the following:

- ❖ Environmental protection is everyone's responsibility. It is valued and displays commitment to (Company Name).
- ❖ Preventing pollution by reducing and eliminating the generation of waste and emissions at the source is a prime consideration in research, process design, and plant operations. (Company Name) is committed to identifying and carrying out pollution prevention opportunities through encouragement and involvement of all employees.
- ❖ Technologies and techniques that substitute nonhazardous materials and use other source reduction approaches will be given top priority in addressing all environmental issues.
- ❖ (Company Name) seeks to show its corporate citizenship by adhering to all environmental regulations. We promote cooperation and coordination among industry, government, and the public, toward the shared goal of preventing pollution at its source.



STEP 2 — DEVELOP YOUR POLLUTION PREVENTION PROGRAM

Pollution prevention should be incorporated into daily company activities. To achieve this, you need to designate a coordinator, put together a pollution prevention team, write a pollution prevention plan, and involve your employees.

1. DESIGNATE A COORDINATOR

The pollution prevention coordinator is one of the most important people behind a successful program, and ultimately will be responsible for making sure the company is working toward its goals. Typically, such a coordinator comes from mid-management. This person needs to be well organized, committed to the program and capable of motivating people. The coordinator will act as a key liaison to top management, helping to make sure that the best pollution prevention ideas are delivered to them and working for cooperation among company departments.

2. PUT TOGETHER A POLLUTION PREVENTION TEAM

A pollution prevention team needs to be organized early on. Each area of the business should be represented on the team. For a small business, the team could be just the owner/operator and an employee. In a larger business, representatives from all departments — maintenance, production, environment, health and safety, purchasing, shipping and receiving, legal, and engineering — as well as plant and executive managers, should be included in the team.

Volunteers to assist the team should be welcomed. They should also be publicly acknowledged for their interest in helping the company, its employees, and the environment.

Since teamwork is so important for the pollution prevention process, team-building activities might be helpful to build cohesiveness in the group.

Team meetings should be regularly scheduled informal sessions focusing on the what, why, where, and how of pollution prevention. Each meeting should have an agenda. It is important to stick to that agenda and get things accomplished, so members feel the time spent on the team is worthwhile.

3. WRITE A POLLUTION PREVENTION PLAN

Writing a pollution prevention plan is the first official task of the pollution prevention team. This plan should include: a statement of support (policy) from management; the team goals; structure and operation of the team; the tools to be used to involve employees; the company goals; a description of an incentive program; criteria for selecting pollution prevention projects; implementation plans for pollution prevention projects; and the plan for employee training.

OUTLINE OF A POLLUTION PREVENTION PLAN

What:	Company pollution prevention policy and goals
Who:	Description of the roles of the pollution prevention coordinator and team, the employees, and management
When:	Schedule for performing assessments, initiating and completing individual pollution prevention projects, and implementing an ongoing program
Where:	Identification of processes and operations where pollution prevention projects would be most effective
How:	Development of procedures for selecting and evaluating projects, training employees, and providing incentives
Why:	Statement of what the benefits will be to the company, employees, customers, the public, and the environment

Present the plan to management and solicit its support. Plan review should be an ongoing part of management meetings to assure accountability to employees, customers, the public, and investors. Annual updating of the plan is recommended.

GOALS

Goals are essential to the success of the program, since they give a company the target to shoot for and help focus energy and ideas on what needs to be done. Goals should be set with care and commitment. The team can develop a variety of goals, including those specific to a particular waste or activity. For example, a company may want to set a goal of zero waste generation as a challenge, much like the zero defect goal of total quality management. Another goal may be to replace toxic substances with nontoxic ones.

Goals also may focus on more general items, such as improving worker health and safety or enhancing the company's image among investors. Goals may address activities such as including pollution prevention in performance evaluations of management, revising accounting systems to include charge-backs for costs associated with wastes, training all employees, and holding periodic team meetings.

It is important that once goals are set, they are not forgotten. They must be reviewed frequently to see if progress is being made. Once you achieve a goal, celebrate, acknowledge, and reward those who helped to achieve it. Then set new goals. Goals should always be realistic, attainable, and, whenever possible, measurable.





4. INVOLVE EMPLOYEES

Your employees are key to your pollution prevention program success; involve them early and make sure they understand the pollution prevention plan. Employees need to know what is expected of them and why. They must feel ownership of the pollution prevention program in order for it to work. The team should encourage employees to participate and bring their ideas to the team. (The form at the end of this chapter can be used to identify team members.) Companies with active quality circles may choose to incorporate pollution prevention items into their agenda.

Employees need to know how to follow recommended procedures before a pollution prevention program will work. Specialized training may be needed for management, line, and maintenance staff. This training also can benefit a company by bringing together employees who do not often have opportunities to interact. Pollution prevention training should be incorporated into new employee orientation, to ensure all employees understand “this is the way we do business.” Pollution prevention activities may be included in performance evaluations, thus ensuring ongoing commitment to the program.

To keep your employees informed, copy the form on the next page, fill in the blanks, and post it in a prominent location along with your company pollution prevention policy.

Once the pollution prevention plan has been written, the next step is to identify pollution prevention opportunities by assessing your processes and wastes. *~*

THE POLLUTION PREVENTION TEAM

Company: _____

Date: _____

Person completing form: _____

Team goal(s): _____

All employees with questions or suggestions regarding waste management and waste reduction are encouraged to contact any one of the people listed below.

Team Leader: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____

Team member: _____

Location: _____



CHAPTER 4

WHAT WASTES DO WE HAVE?

To prevent pollution, a company must know where wastes are being produced in its operations. This may involve gathering a great deal of data, but the information obtained is crucial to good decision-making. Two approaches may be used: one looks at total waste releases (into air, water, or land) in each process and then backtracks to find waste sources; the other tracks materials from their point of entry into the plant until they exit as either products or wastes. Both methods give a basis for determining where wastes are being created, how they might be reduced, and if, in fact, they are being minimized.

STEP 3 — ASSESS PROCESSES AND WASTE

Before looking at specific processes, an overall look at your business plans and procedures is necessary. The plans and procedures need to be designed to promote waste reduction. Use Form 4.1 at the end of this chapter to help you complete your evaluation.

Be careful not to “build into the system” procedures that generate excess waste. If you are starting or expanding a business, it is important to consider pollution prevention in all planning decisions. Each section of your business either affects, or is affected by, the quantity of waste your business generates. For example, the way you plan and conduct your marketing, operations, and financial activities will have a positive or a negative effect on your pollution prevention efforts.

Now is the time to look at each part of your business in more detail, to gather background information and tour the facility.

1. GATHER BACKGROUND INFORMATION

The first task toward understanding waste generation is gathering background information on the facility. This involves looking at the type and quantity of raw materials used, the type and quantity of wastes generated, the individual production mechanisms, the way processes are related, and the economics of raw materials and wastes. When gathering this information, the team should begin to track wastes to see if there are seasonal or shift variations in wastes generated. The pollution prevention team should gather this information, using the following guide.





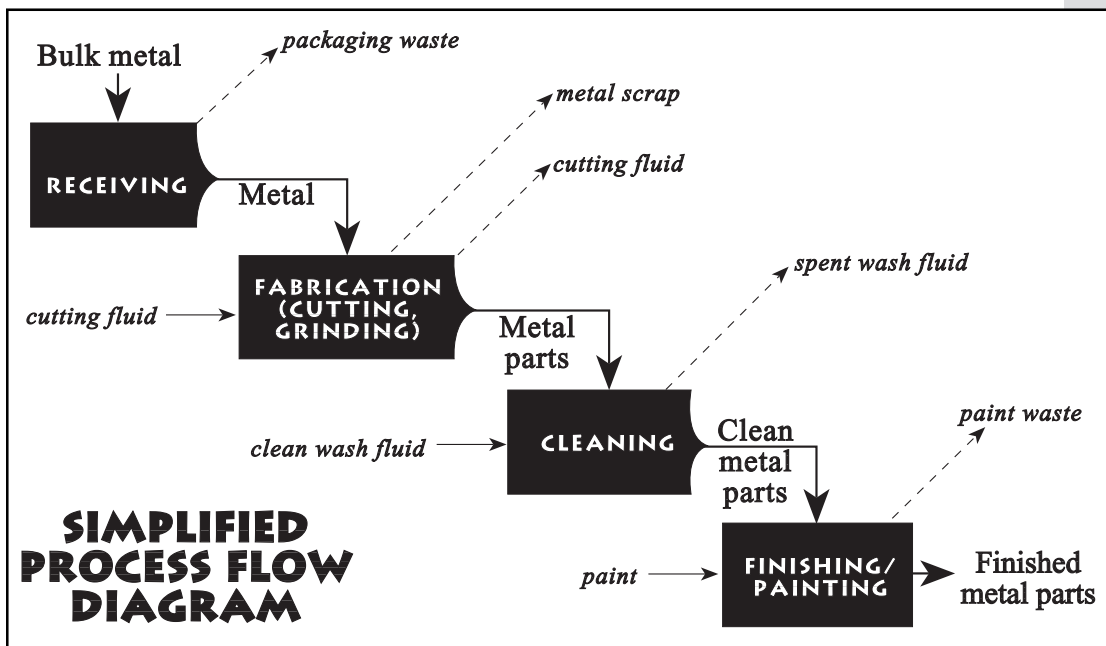
INFORMATION ON	FROM
Raw materials use	<ul style="list-style-type: none"> Purchasing records Production logs Inventory records Packaging material discarded MSDSs Shipping and receiving logs Vendors Annual report
Waste generated	<ul style="list-style-type: none"> Waste manifests Environmental reporting TRI data Waste collections and storage Sewer records (POTW) Production logs Permits/applications Environmental violations Flow diagrams Laboratory analyses Annual report Obsolete expired stock Rejected product Spill and leak reports
Process information	<ul style="list-style-type: none"> Operations manuals (SOPs) Production logs Vendor information Flow diagrams Control diagrams Product specifications Quality control guidebook
Product relationships	<ul style="list-style-type: none"> Product-to-raw material data Production logs Flow diagrams Product specifications Quality control data Facility layout Requirements for next process
Economic information	<ul style="list-style-type: none"> Cost accounting reports Costs for products, utilities, raw materials, labor Pollution control costs Operating costs for waste handling and disposal

Useful information can also be gathered from employees working on the line or in engineering, purchasing, inventory, shipping and receiving, or accounting.

2. DO A MATERIALS BALANCE

a. Define Production Units — Define a production unit for each process to measure waste reductions. A production unit is simply a set quantity of product: a ton of plastic; a gallon of acid; a number of copies; etc. Once the production unit is defined, wastes generated can be quantified as waste per production unit, as in the following: a printing press may use 1,000 copies as a production unit and define wastes as “waste per 1,000 copies.” This is more helpful than looking at total amounts of waste generated over a time period.

b. Characterize General Process — A typical process has raw materials going in, products coming out, and waste being generated. These can be shown in a simplified process flow diagram. This may not resemble the actual process, but it shows the movement of raw material through the process. It also shows the final product and any wastes produced.



c. Understand Unit Processes — Most production operations can be subdivided into a series of unit processes. These are parts of the overall process, separated by a set quantity of product. For example, the general process of metal parts fabrication can be separated into four individual, or unit, processes:

- receiving bulk metal;
- cutting, bending, or shaping metal;
- cleaning metal; and
- painting or coating metal.

Other unit processes that might be involved include:

- assembling parts;
- packaging;
- storage; and
- shipping of assembled parts.

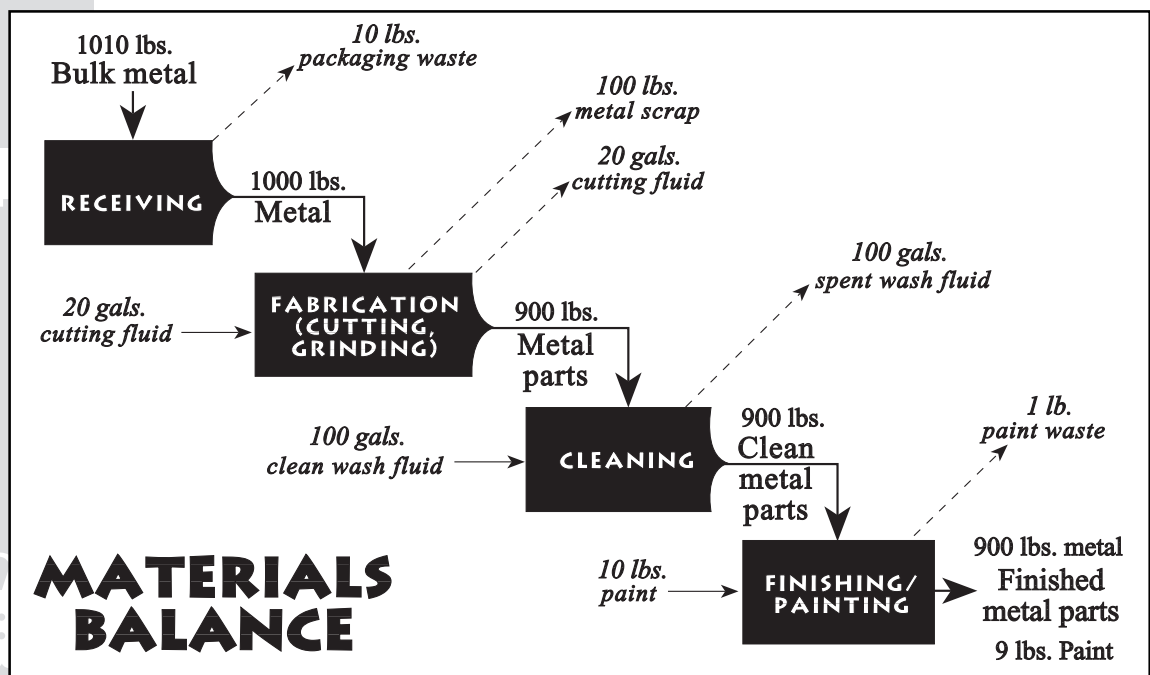
Each unit process has its own inputs and outputs. A product output in one step may become input for the following step. The unit process can be shown in a more detailed flow diagram. This should include the type, composition and quantity of raw materials, products, and wastes. The diagram may also include materials, such as lubrication fluids, cooling water, cleaning agents and the like. Quantities may also be shown.

All wastes released into the environment, whether gas, liquid, or solid, should be characterized. Wastes should include emissions from stacks, pipes, tanks, vessels, or leaking equipment. Also spent wash waters or cleaning solvent, cooling water, overspray from painting, cleaning rags, scrap material and other wastes should be included.

d. Conduct a Materials Balance — A materials balance is a simple accounting of all materials going in and coming out of the business. A materials balance should be done for each unit process and for the entire production line as well; beginning quantities should equal ending quantities. This kind of materials accounting can help determine if materials are escaping in a given process. For example, in a solvent tank the difference between the amount of solvent put in and solvent taken out is solvent that has been lost through evaporation, spills, and drips.

In a physical process where materials do not go through chemical reactions, raw materials not converted into a product usually end up as waste. In a chemical process, the materials balance is more complicated. Raw materials are converted to products through one or more chemical reactions. Some of the raw material may end up as waste along with the by-products of the chemical reaction.

How does one find information needed for a materials balance? Although actual measurement of materials is preferred, a daily product log or cycle might provide the necessary information.



When a materials balance is complete, the actual amount of each waste created by a process is known, as is the source of the waste. These numbers can be used as a baseline for waste generated at the start of a pollution prevention program. They can then be compared to new materials balances throughout the program.

3. TOUR FACILITY

The assessment team should study the facility's operation in detail, looking at each process while in operation and during shutdown. This examination will help ensure all materials and wastes are identified. The team should look at:

- procedures used by line workers;
- quantities and concentrations of materials;
- collection and handling of wastes;
- recordkeeping;
- flow diagrams;
- leaking lines and poorly operating equipment;
- spill residue;
- damaged containers; and
- characteristics of wastes.

Photographs will help the team recall details. The team should talk with line staff as much as possible and try to determine required operating conditions, product specifications, equipment specifications, and daily routines. Finding out when waste is generated, whether by the regular process or by things like upsets, off-spec products, and spills, is important. The team also should talk with maintenance and housekeeping staff to find out when, how, and why the process is serviced, and to determine if maintenance is preventive or if it is done in response to breakdowns.

All waste sources, even those not initially selected as potential pollution prevention opportunities, should be examined. The team should survey the entire facility, including operations like shipping and receiving, purchasing, inventory, vehicle maintenance, waste handling and storage, laboratories, powerhouses and boilers, cooling towers, and maintenance. In all these departments, the team should visit with staff and note potential opportunities to prevent pollution.

The following checklists will help you gather the information you need about waste generation at your facility. Once you have collected information about how wastes are generated, the next chapter will help you identify opportunities to reduce waste. *~*



OVERALL LOOK AT BUSINESS PLANS AND PROCEDURES

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Use this form to determine whether your overall business plans and procedures support pollution prevention.

Purchasing:

- | | | |
|--|------------------------------|-----------------------------|
| Are all purchases routed through one person or department? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you review MSDSs to evaluate toxicity of raw materials prior to purchase? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are materials ordered as needed? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are minimum amounts ordered? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Shipping and receiving:

- | | | |
|---|------------------------------|-----------------------------|
| Are you reducing and/or recycling packaging wastes? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Can containers and pallets be returned or recycled? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you inspect all incoming materials? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Inventory:

- | | | |
|--|------------------------------|-----------------------------|
| Do you know the shelf life of all materials? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Is there an inventory control system? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Is there a central stockroom? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Is "just-in-time" philosophy used? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Is "first-in, first-out" philosophy used? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Processing:

- | | | |
|---|------------------------------|-----------------------------|
| Do you keep records on the amount of raw materials used as a means to monitor process efficiency? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you know the quantity of waste produced by each process? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you have written standard operating procedures? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Personnel:

- | | | |
|--|------------------------------|-----------------------------|
| Do workers know processes and practices that produce waste? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are workers and management developing a program to promote pollution prevention in your community? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Does company policy promote employee training in the area of pollution prevention? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Waste handling and storage:

- | | | |
|--|------------------------------|-----------------------------|
| Can the sources of all wastes be identified? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are waste streams segregated? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Is a "waste inventory" control system in place? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are your storage areas designed to control spills and other mishaps? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you attempt to exchange those wastes that can not be reduced? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

Finances:

- | | | |
|--|------------------------------|-----------------------------|
| Do you consider the cost of waste disposal when developing profit and loss statements? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you charge waste-handling costs directly to the process generating the waste? | <input type="checkbox"/> yes | <input type="checkbox"/> no |

PROCESS IDENTIFICATION LIST

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Use this form to list the types of processes in your business. This information is vital for identifying waste reduction opportunities. Check “yes” for those processes that take place in your facility. Use the extra spaces for processes not listed here.

Process			Comments
Degreasing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Dry cleaning	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Electroplating	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Engine repair	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Equipment repair	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Food preparation	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Glazing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Janitorial	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Laundering	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Metal finishing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Painting	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Photofinishing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Platemaking	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Plumbing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Printing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Purchasing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Receiving	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Rinse baths	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Roofing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Shipping	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Stripping (paint, etc.)	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Tank/vessel cleaning	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Welding/Brazing	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Woodworking	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____

MATERIALS IDENTIFICATION LIST

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Make enough copies of this form that you have a form for each process. List the raw materials you use for each process in your business (form 4.2). Product labels, suppliers, MSDSs, and purchase order records should provide the information you need to complete this form.

Process: _____

First material used

Product name: _____

Chemical name: _____

Amount used: _____ (gallons/lbs/drums) per (day/month/year)

Second material used

Product name: _____

Chemical name: _____

Amount used: _____ (gallons/lbs/drums) per (day/month/year)

Third material used

Product name: _____

Chemical name: _____

Amount used: _____ (gallons/lbs/drums) per (day/month/year)

Fourth material used

Product name: _____

Chemical name: _____

Amount used: _____ (gallons/lbs/drums) per (day/month/year)

Fifth material used

Product name: _____

Chemical name: _____

Amount used: _____ (gallons/lbs/drums) per (day/month/year)

PROCESS INFORMATION

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Copy this form and use one for each process in your business. This form is intended to help you identify and organize information on each process in your business.

Process: _____

Documents

Comments

Process description	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Process flow diagram	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Process flow measurements	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Process stream analysis	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Piping and instrument analysis	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Plot and elevation plan(s)	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Work flow diagrams	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Operating manuals	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Equipment list	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Equipment specifications	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Batch sheets	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Product composition sheets	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Inventory records	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Operator logs	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Production schedules	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Material safety data sheets	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Hazardous waste manifests	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Emission inventories	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Annual/biennial reports	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
Permits/permit applications	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____
_____	<input type="checkbox"/> yes	<input type="checkbox"/> no	_____

WASTE IDENTIFICATION LIST

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Copy this form so you have one form for each process. Check the types of wastes generated by each of the processes identified earlier. Record the estimated amount of waste generated by each process. Record this information by waste type.

Process: _____

✓ Waste Type	Amount of Waste Generated per Unit
<input type="checkbox"/> Air Emissions	_____
<input type="checkbox"/> Evaporation losses	_____
<input type="checkbox"/> Maintenance losses	_____
<input type="checkbox"/> Solid wastes (paper, boxes.)	_____
<input type="checkbox"/> Outdated stock	_____
<input type="checkbox"/> Overspray (paint, etc.)	_____
<input type="checkbox"/> Spills	_____
<input type="checkbox"/> Spoiled batches	_____
<input type="checkbox"/> Wastewater discharges	_____
<input type="checkbox"/> Corrosive waste	_____
<input type="checkbox"/> Reactive waste	_____
<input type="checkbox"/> Ignitable waste	_____
<input type="checkbox"/> Toxic waste	_____
<input type="checkbox"/> _____	_____
<input type="checkbox"/> _____	_____
<input type="checkbox"/> _____	_____
<input type="checkbox"/> _____	_____
<input type="checkbox"/> _____	_____
<input type="checkbox"/> _____	_____

Notes: _____

FACILITY TOUR CONSIDERATIONS

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Use this form on your plant tour. These general questions will help you focus your attention on possible sources of waste in your company. Your initial impressions can provide vital clues about how your wastes are generated and how they may be minimized or prevented.

- | | | |
|--|------------------------------|-----------------------------|
| Does your facility show signs of poor housekeeping? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Are there spills, leaking containers, or water running? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you see discoloration or corrosion on walls, work surfaces, ceiling, or pipes? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you see smoke, dirt, or fumes? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you smell strange odors, or feel irritation to your eyes, nose, or throat when you enter? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you see open containers, stacked drums, shelving that is too small, or other signs of poor storage? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you see containers that don't have labels? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you notice wasteful practices, such as dripping water, steam evaporation, drag-out, etc.? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you see outdated stock or materials in storage? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you find a history of spills, leaks, and accidents or fires? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do you have trouble locating emergency equipment? | <input type="checkbox"/> yes | <input type="checkbox"/> no |
| Do employees have comments about sources of waste? | <input type="checkbox"/> yes | <input type="checkbox"/> no |



CHAPTER 5

HOW CAN WE REDUCE OR PREVENT WASTE?

Once a company's pollution prevention team reviews the existing production processes, they can begin to look for opportunities to prevent pollution. This can be accomplished by setting priorities, identifying various options, and documenting the findings.

STEP 4 — IDENTIFY OPPORTUNITIES TO PREVENT WASTE

1. SET PRIORITIES

The pollution prevention team should look at waste streams and unit processes, then set priorities. Top management should be closely involved in this step. All input and output streams should be ranked, starting with those needing immediate attention and followed by those that are less urgent. The team should ask "Which are our most serious problems? Which deserve our attention first?" The following factors could be considered when setting these priorities:

- U.S. EPA's target chemicals from the 33/50 program;
- Toxic Release Inventory chemicals;
- high purchase and/or disposal costs;
- hazardous waste;
- regulatory concerns;
- high use and/or release rates;
- potential for removing bottlenecks in production or waste treatment;
- potential liability because of danger to employees, environment, or public;
- potential for preventing pollution;
- high volume waste;
- carcinogens;
- hazardous air pollutants;
- CFCs and other future banned materials; and
- local citizen concern.





The ranking can be done on a total-point basis using a simple numerical system, or on a department or product basis. Once waste streams are ranked, the team can begin selecting candidates for pollution prevention projects.

2. IDENTIFY OPTIONS

Brainstorming is a good way to find new ideas. The following rules should prevail: the team should go for quantity of ideas, withholding judgments until all the brainstorming is done. Sometimes the idea that works best is the one that initially sounded the strangest. Simple, but effective ideas may include:

- ship or receive items in bulk;
- reuse containers;
- order materials “just in time” to avoid expiration;
- set up central stockroom and inventory control system;
- reuse solvents; and
- segregate waste streams.

Other options may be available as well. They might include ideas for recycling materials inside a process or for reducing waste sources, for example:

- using less toxic raw materials;
- using raw materials which reduce the amount of waste;
- using raw materials which require less frequent equipment cleaning;
- changing processes or operating conditions for improved efficiency; and
- improving preventive maintenance.

In addition to brainstorming within your company, you might find more information through outside sources, such as:


- vendors and suppliers;
- trade journals;
- trade associations; and
- private consultants.

Appendix A lists local, state, and federal agencies which have resources to help. Appendix B also has some general pollution prevention ideas.

3. DOCUMENT YOUR FINDINGS

File all assessment team findings, data, and meeting records with your normal business records. This will:

- document the activities of the team;
- serve as a record of the good faith efforts of your company to prevent pollution and protect both workers and the community;
- provide base line data to allow the team to determine if selected waste reduction efforts actually reduce waste and save money; and
- provide the foundation for developing a pollution prevention program;

The following forms can be used to identify and describe pollution prevention options. Chapter 6 will help you choose which options to implement. 



POLLUTION PREVENTION OPTIONS

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Use this form to list all of the options you identify before, during, and after your plant tour. Also list all of the options identified by other sources.

[illegible]

POLLUTION PREVENTION OPTION DESCRIPTIONS

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Make enough copies of this form to list and describe each option you have generated. This form is intended to show which waste streams, raw materials, and products are influenced. It also records if the option is worthy of further consideration.

Option: _____

Brief description: _____

Waste stream(s) affected: _____

Raw materials affected: _____

Products affected: _____

Recommended for further study:

☐ yes

☐ no

Why? _____



CHAPTER 6

WHERE SHOULD WE MAKE OUR FIRST CHANGES?

The pollution prevention team should review suggested pollution prevention options and their costs, and eliminate those options that clearly are not practical. The team should evaluate the remaining options further, looking closely at their technical and economic feasibility.

It is a good idea to rank pollution prevention ideas based on the priorities of the team and the company's management. The rankings of "high," "moderate," and "low" will convey the idea that these options are all possibilities and will help provide direction for the company's future activities. The rankings should be reviewed periodically by the pollution prevention team to make certain they reflect current technologies, priorities, and economics.

STEP 5 — EVALUATE POLLUTION PREVENTION OPPORTUNITIES

1. IDENTIFY BENEFITS

The team should identify specific benefits of a project, including reduced waste generation costs, improved worker safety and morale, better community relations, reduced liability, reduced regulatory concerns, and improved relations with regulatory agencies. The benefits may be difficult to quantify, but they should be listed anyway.

Rank the options in the order of the waste management hierarchy (see Chapter 1). Remember that source reduction is the most preferred option, followed by recycling, treatment, and, finally, disposal.

2. TECHNICAL FEASIBILITY

There are many factors to be considered when determining if a project is technically feasible. The team should look at whether the technology has been used in similar processes, whether it changes product quantity or quality, and whether it fits into the facility layout. Form 6.1 at the end of this chapter will remind you of questions to ask.

Staff directly affected by a project should be involved in making the decision to move ahead. Their ownership of the project is critical to its success. They understand the details which might not be apparent to technical "experts" who do not have daily contact with the processes involved in the project.





3. ECONOMIC FEASIBILITY

Once a pollution prevention project has been found to be technically feasible, the economics should be further evaluated. To evaluate the economic feasibility of a pollution prevention project, it is important to consider the full cost of the current practices and the full cost of the pollution prevention project. Some of the costs may be obvious, such as capital costs for new equipment and disposal costs; however, some of the costs may be hidden, such as:

- special storage facilities;
- storage inspection and monitoring;
- labor (waste management, paperwork, spill response, training, etc.);
- safety equipment;
- safety training;
- higher insurance premiums;
- spill containment equipment;
- labeling;
- reporting;
- fees/taxes;
- permits; and
- regulatory compliance.

In addition to these hidden costs, which can usually be assigned a dollar value, there are costs which are very difficult to price, such as future liability, company image, potential penalties, and employee morale.

The pollution prevention team should use the expertise of staff members in engineering, purchasing, maintenance, inventory, shipping, receiving, and accounting to determine the full costs. If an option does not involve capital expense, the reduced costs of handling waste may be the primary benefit. More efficient operating practices is an example of a pollution prevention project that may have no capital costs. These types of projects may be the most practical to implement first.

COST ALLOCATION

A cost allocation system is an important element of a pollution prevention program. Each department or process should be charged for total waste management costs of the wastes they generate. The charges should cover full cost of the waste, as discussed earlier. The cost allocation system should lower the total overhead cost, since most companies charge waste disposal costs to overhead. It also will provide incentives for employees in the departments or processes to reduce their waste charges.

The “**payback period**” is one test for deciding whether an option is feasible. This is the amount of time it takes to recover initial investment through annual cost savings. To do a simple calculation of the payback period, add up the option’s capital, start-up and other costs. Divide that sum (the option’s initial investment) by the full annual waste handling cost savings. If the total operating costs of an existing process and a “new” process are very different, the total annual operating cost savings should be used in place of the full annual waste handling cost savings. These total annual operating cost savings would include the reduced costs of handling wastes.

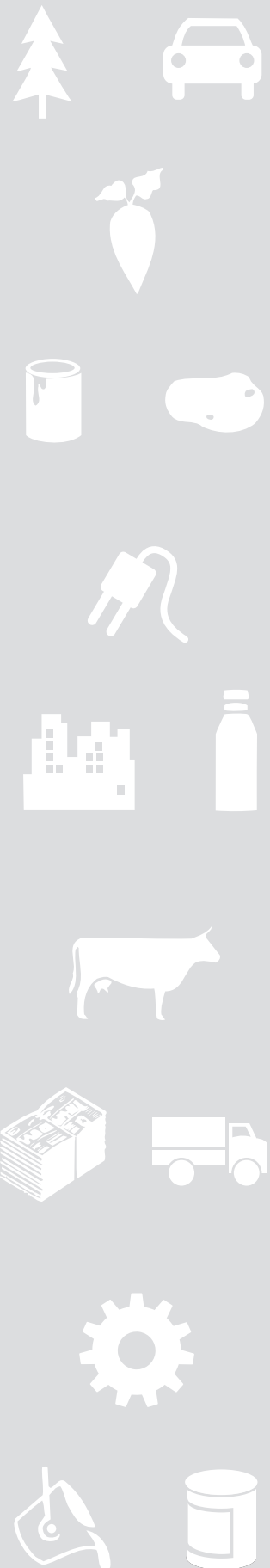
Typically, if the payback period is less than five years, the project may be considered economically feasible. The criteria vary depending on the company, and there may be other measures to consider; the accounting department staff should be consulted. Forms 6.2 and 6.3 at the end of this chapter will help you evaluate economic feasibility and calculate the payback period. For a more detailed cost analysis, contact one of the resources listed in Appendix A.

Other methods for determining long-term costs include net present value, internal rate of return, and profitability index. Each company will consider its own criteria of feasibility.

STEP 6 — CARRY OUT PROJECTS

After the team selects the projects, they must get final management approval to begin. If top management support has been gained as described earlier, the approval should be easy to obtain. Details of the projects, along with budgets and benefits, should be presented to management. When a project is approved, it should be adequately funded.

Once a project begins, it will be carried out like any other company project. Personnel directly affected should be involved from the start, and any necessary training should be provided. All employees should receive progress reports about each project and should be encouraged to provide suggestions for improvement. *~*



TECHNICAL EVALUATION CHECKLIST

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Copy this form so that you have one form for each option you are evaluating. Check the appropriate response. Skip questions that do not apply. The purpose of this form is to help you evaluate the technical feasibility of each option.

Option: _____

	Yes	No	Not Sure
Is existing technology available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option have a proven track record?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are other businesses using this option?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If down time is required, is it reasonable?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is this option easy to carry out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are materials and parts readily available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is your plant layout and design capable of incorporating this option?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are required utilities available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will this option maintain product quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will customers accept the product?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will this option maintain productivity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can this option be easily serviced?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will the vendor guarantee this option?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you certain that this option will create less waste and does not move waste from one form to another? (Example, from solid waste to air emissions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option reduce wastes at their source?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you determined that this option will improve or maintain worker safety or health?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option use existing staff or training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ECONOMIC EVALUATION CHECKLIST

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Copy this form so you have one form for each option you are evaluating. Check the appropriate response. Skip questions that do not apply. The purpose of this form is to evaluate the economic feasibility of each option.

Option: _____

	Yes	No	Not Sure
Is this option within your price range? (Consider both capital and ongoing operations costs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option have an acceptable payback period? (less than one year is considered excellent)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option reduce your raw material costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option reduce your utilities costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option reduce material and waste storage costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does this option reduce regulatory compliance costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will this option reduce costs associated with worker injury or illness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will this option reduce your insurance premiums?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Will this option reduce your waste disposal costs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PROFITABILITY

Company: _____

Date completed: _____

Person completing form: _____

Instructions: Use this form to calculate the simple payback period of an option under consideration. If you want to do a more detailed economic analysis, contact your accountant or an agency listed in Appendix A.

Option: _____

Capital costs

Purchased equipment: _____

Materials: _____

Installation: _____

Utility connections: _____

Engineering: _____

Start-up and training: _____

Other capital costs: _____

Total capital costs: _____

Incremental Annual Operating Costs

Change in disposal costs: _____

Change in raw material costs: _____

Change in utilities costs: _____

Change in other costs: _____

**Annual net
operating cost savings:** _____

$$\text{Payback period (in years)} = \frac{\text{Total capital costs}}{\text{Annual net operating cost savings}} = \underline{\hspace{2cm}}$$

CHAPTER 7

HOW WILL WE KNOW HOW WE'RE DOING?

Once a pollution prevention program is set up, it should be evaluated and updated on an ongoing basis. The team should review all stages of the program, from management support and team selection to success of individual projects. This evaluation ensures that the program will continue to grow and improve.

STEP 7 — EVALUATE PROJECTS AND THE PROGRAM

The progress of the pollution prevention program can be evaluated by looking at individual activities and projects. An easy way to measure progress is to measure actual waste reduction in terms of changes in quantities and hazard levels, and to compare the waste per production unit reported in the current year to the waste per production unit reported in the previous year.

A change in hazard levels also can be used for program evaluation based on toxicity of the waste and industrial hygiene/employee exposure-type measurements. These kinds of measurements will be most helpful when a company is evaluating alternative materials.

It is important to note which strategies and techniques have been very successful, marginally successful, or unsuccessful. The team should try to identify factors leading to each project's success or failure.

The following criteria may help a team evaluate a program:

- **Management support** — Has management issued statements of support? Approved projects? Provided ideas? Praised and publicized successes?
- **Employee involvement** — Have employees been enthusiastic? Has participation been widespread? Are employees using skills from the program's training? Are they supporting projects? Providing ideas?
- **Projects** — Have projects been completed within budgets? Schedules? With waste reductions achieved? With savings of costs and raw materials attained? With product quality improved? With worker safety improved? Has cost allocation system of wastes been put into place?

Form 7.1 at the end of this chapter can be used to help you evaluate your program.





MODIFY THE PROGRAM

To ensure continuing progress and success, the team should change the program as needed. Successful strategies and techniques can be used again or adapted to other areas where progress has been slow. The initial pollution prevention goals should be redefined and/or expanded, reaching for the ultimate goal of zero waste generation. *~*

POLLUTION PREVENTION PROGRAM REVIEW

Company: _____

Date completed: _____

Date of last audit: _____

Person completing form: _____

Instructions: Check the appropriate response. Keep this form to compare with future evaluations. This will help you track the progress of your pollution prevention program.

1. Have you carried out all your previously identified pollution prevention options? ☐ yes ☐ no

Describe : _____

2. Does pollution prevention remain a priority for workers and management? ☐ yes ☐ no

Describe: _____

3. Have your pollution prevention efforts reduced costs through:

Reduced raw materials costs ☐ yes (estimate \$ _____) ☐ no

Savings on pollution control equipment ☐ yes (estimate \$ _____) ☐ no

Reduced compliance costs ☐ yes (estimate \$ _____) ☐ no

Reduced disposal costs ☐ yes (estimate \$ _____) ☐ no

Improved safety and health ☐ yes (estimate \$ _____) ☐ no

_____ ☐ yes (estimate \$ _____) ☐ no

_____ ☐ yes (estimate \$ _____) ☐ no

_____ ☐ yes (estimate \$ _____) ☐ no

_____ ☐ yes (estimate \$ _____) ☐ no

_____ ☐ yes (estimate \$ _____) ☐ no

FORM 71 (CONTINUED)

4. How effective have your efforts been at reducing the following types of wastes?

<input checked="" type="checkbox"/>	Waste	Amount reduced per unit
<input type="checkbox"/>	Air emissions	
<input type="checkbox"/>	Evaporative waste	
<input type="checkbox"/>	Hazardous waste	
<input type="checkbox"/>	Heat or energy loss	
<input type="checkbox"/>	Maintenance or cleanup	
<input type="checkbox"/>	Outdated stock	
<input type="checkbox"/>	Overspray	
<input type="checkbox"/>	Solid wastes	
<input type="checkbox"/>	Spills and container leaks	
<input type="checkbox"/>	Spoiled production runs	
<input type="checkbox"/>	System leaks	
<input type="checkbox"/>	Wastewater	
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

Notes: _____

CHAPTER 8

HOW CAN WE KEEP THE BALL ROLLING?

Once a pollution prevention program is underway, it must be carefully maintained. This means assuring commitment at all levels, including upper management. It's important to maintain employee enthusiasm and interest. Here are some ideas for maintaining the program.

STEP 8 — MAINTAIN THE PROGRAM

1. ROTATE POLLUTION PREVENTION TEAM

To keep fresh ideas flowing, rotate the team members. New employees, new leaders and new department heads can add energy and new ideas to your existing program. Some members leaving the team may choose to serve as consultants, giving the team continuity. The team should continue to have members from all levels and departments. Consistency and continuity will be provided, in part, by written procedures and directions for the team.

2. REFRESHER TRAINING

A company should provide training to keep pollution prevention visible to employees. Pollution prevention training should be incorporated into other ongoing training, such as health and safety, environmental, processes, etc.

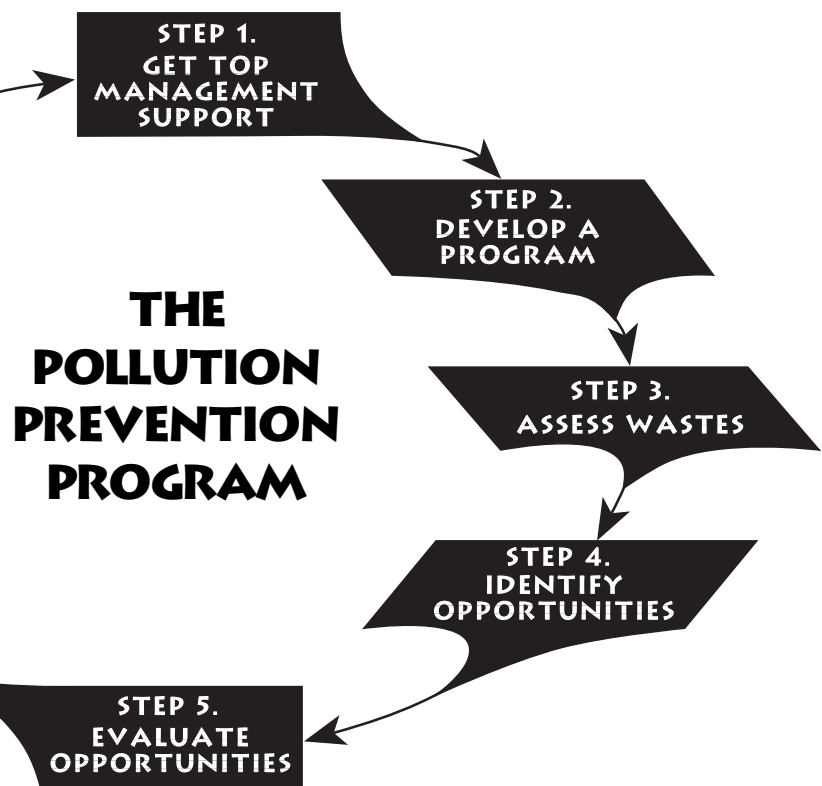
3. CELEBRATE AND REWARD SUCCESSES

Publicity is one of the most effective means of keeping a pollution prevention program going. Publicity inside a company raises employee, management, and shareholder awareness of pollution prevention activities and encourages further participation. Bulletin boards, newsletters, memos, and awards can help stimulate interest in the program. Ceremonies and incentive awards for individuals, teams, and departments help celebrate successes. Cost savings, waste reductions, and improvements in product quality are good things to focus on.

Pollution prevention can be an excellent public relations tool. Any reduction in waste is a gain to employees, the community, and the environment, and should be publicized carefully and consistently. News releases, conferences, and demonstrations are also effective tools.



Public awareness can improve through various award programs at local, state, and federal levels. Industry associations and other organizations also recognize significant contributions. Part of the pollution prevention team's responsibilities should include active pursuit of these awards. Also, case studies can demonstrate success and emphasize the benefits to the company from the pollution prevention efforts. ~



Congratulations! You've completed the steps in this booklet and now should have a Pollution Prevention Program in place. Pollution prevention is an ongoing process. Keep it going!

APPENDIX A: WHERE CAN WE GO FOR HELP?

IDAHO DIVISION OF ENVIRONMENTAL QUALITY

POLLUTION PREVENTION PROGRAM

1410 N. Hilton
Boise, ID 83706
(208) 373-0260

DEQ's Pollution Prevention Program has resources to assist you with your pollution prevention efforts.

SMALL BUSINESS ADVOCATE

1410 N. Hilton
Boise, ID 83706
(208) 373-0502

The Small Business Advocate can help with compliance to the Clean Air Act Amendments.

PERMITS AND ENFORCEMENT DIVISION

1410 N. Hilton
Boise, ID 83706
(208) 373-0298

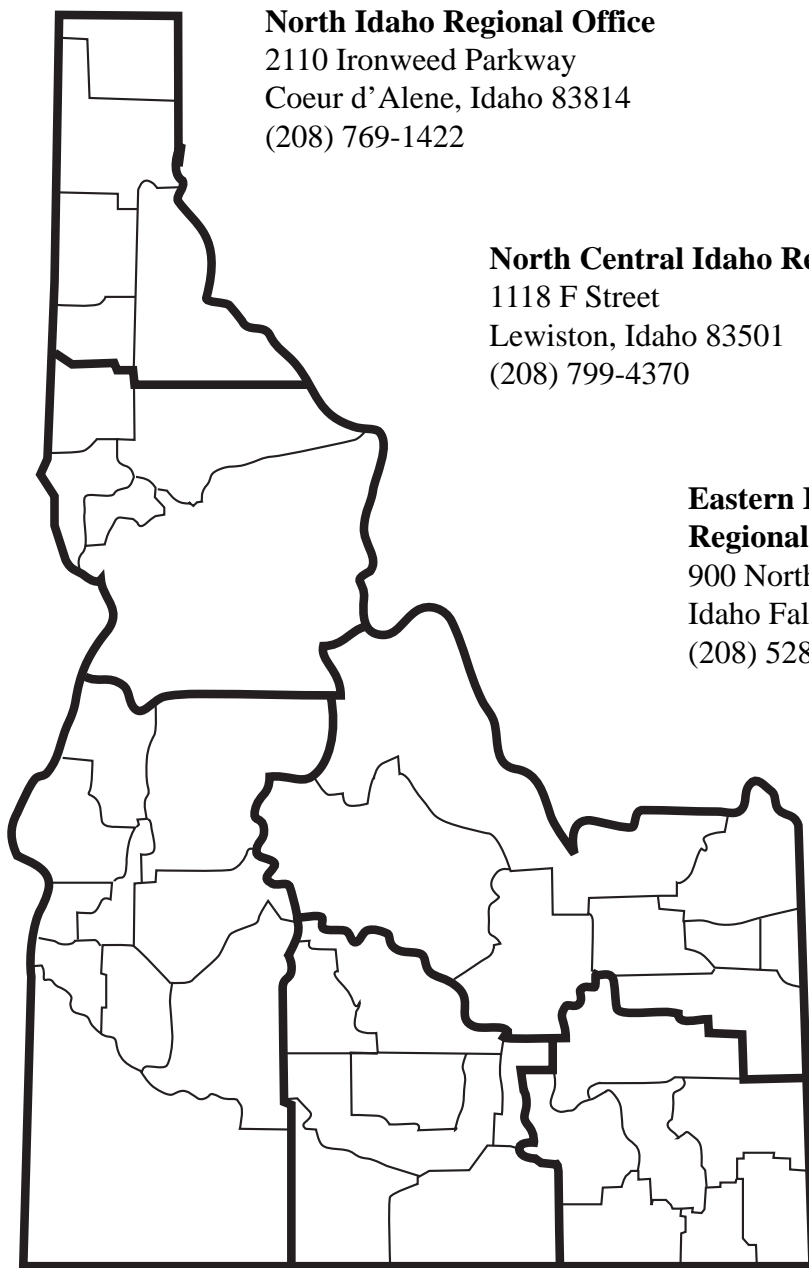
The Permits and Enforcement Division can help you with questions about environmental regulations and compliance.





DEQ REGIONAL OFFICES:

The Regional Offices can help you with pollution prevention, regulations, compliance, complaints, and local issues.



North Idaho Regional Office

2110 Ironweed Parkway
Coeur d'Alene, Idaho 83814
(208) 769-1422

North Central Idaho Regional Office

1118 F Street
Lewiston, Idaho 83501
(208) 799-4370

Eastern Idaho Regional Office

900 North Skyline Drive
Idaho Falls, Idaho 83402
(208) 528-2650

Southwest Idaho Regional Office

1445 North Orchard
Boise, Idaho 83706
(208) 373-0550

South Central Idaho Regional Office

601 Pole Line Road,
Suite #2
Twin Falls, Idaho 83301
(208) 736-2190

Southeast Idaho Regional Office

224 South Arthur
Pocatello, Idaho 83204
(208) 236-6160

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10 EPA

1200 Sixth Avenue
Seattle, WA 98101 (206) 553-5810

Region 10 EPA is the Northwest area contact for all EPA regulatory programs. It also maintains a lending library open to the public. A mailing service is provided for inquiries from outside the Seattle area.

POLLUTION PREVENTION OFFICE

401 M Street SW
Washington, D.C. 20460 (202) 245-3557

This office is the main EPA contact for pollution prevention information. It can provide general information on pollution prevention, including fact sheets and a pollution prevention training manual.

POLLUTION PREVENTION INFORMATION CLEARINGHOUSE (PPIC)

U.S. EPA (3404)
401 M Street
Washington, DC 20460 (202) 260-1023

The PPIC has three functions: (1) distribution of non-regulatory documents; (2) a hotline for referrals and document requests; and (3) a collection of pollution prevention documents.

PPIC publishes a quarterly distribution list.

ENVIRO\$EN\$E

Enviro\$en\$e is EPA's new electronic library of information on pollution prevention, technical assistance, and environmental compliance. Enviro\$en\$e permits online access to EPA databases, including TRI, Solvent Substitutes, and a Pollution Prevention Reference database, and offers a daily summary of *Federal Register* contents. To access:

Via modem: Use a personal computer with a modem (2400 to 14,400) and communications set to the following: 8, N, 1; Emulations: ANSI or VT-100. Telephone number (703) 908-2092. For more informations, call the hotline at (703) 908-2007 or the system manager at (202) 260-4640.

Via Internet: You need to have access to the Internet and World Wide Web navigations software such as Mosaic. Use the following address: <http://wastenot.inel.gov/environsense>. (Access via WWW allows hypertext connection to any other WWW server.) For more information, call the hotline at (208) 526-6956 or the system manager at (202) 260-3161.





HOTLINES

RCRA/SUPERFUND HOTLINE — 1-800-424-9346

This hotline will respond to questions about the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Underground Storage Tanks (UST), the Superfund Amendments Reauthorization Act (SARA); and the Chemical Emergency Preparedness (CEPP) Community Right To Know/Title III program. It also answers questions about the Pollution Prevention Information Clearinghouse.

SMALL BUSINESS OMBUDSMAN HOTLINE: 1-800-368-5888

This hotline is a good contact to help the individual or small business locate the proper government hotline or office to deal with a given question or problem. It has about 200 publications for distribution, many of which deal with interpretation of EPA regulations. It will answer questions about the Pollution Prevention Information Clearinghouse.

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW HOTLINE: 1-800-535-0202

This hotline will respond to any SARA Title III related questions. This includes helping fill out annual reporting forms and sending out documents.

WASTE EXCHANGES

INDUSTRIAL MATERIALS EXCHANGE (IMEX)

172 20th Avenue
Seattle, WA 98122
(206) 296-4899

NATIONAL MATERIALS EXCHANGE

8621 N. Division, Ste. C
Spokane, WA 99208
(509) 466-1532
FAX: (509) 466-1041

MONTANA MATERIALS EXCHANGE

MSU Extension Service
Taylor Hall
Bozeman, MT 59717
(406) 994-1748
FAX (406) 994-5417

OTHER RESOURCES

- Local Governments
- Small Business Development Centers
- Health Districts
- Colleges and Universities
- Trade Associations
- Trade Journals
- Vendors
- Consultants





APPENDIX B: POLLUTION PREVENTION IDEAS

GOOD OPERATING PRACTICES

WASTE SEGREGATION

- ✓ Prevent mixing hazardous wastes with nonhazardous wastes.
- ✓ Store materials in compatible groups.
- ✓ Segregate different solvents.
- ✓ Isolate liquid wastes from solid wastes.

PREVENTIVE MAINTENANCE PROGRAMS

- ✓ Maintain equipment history cards on equipment location, characteristics, and maintenance.
- ✓ Maintain a master preventive maintenance (PM) schedule.
- ✓ Keep vendor maintenance manuals handy.
- ✓ Maintain a manual or computerized repair history file.

TRAINING/AWARENESS-BUILDING PROGRAMS.

Provide training on:

- ✓ operation of equipment to minimize energy use and material waste;
- ✓ proper materials handling to reduce waste and spills;
- ✓ importance of pollution prevention and the economic and environmental ramifications of hazardous waste generation and disposal;
- ✓ detecting and minimizing material loss to air, land, or water; and
- ✓ emergency procedures to minimize lost materials during accidents.





EFFECTIVE SUPERVISION

- ✓ Supervise closely to improve production efficiency and reduce inadvertent waste generation.
- ✓ Centralize waste management.
- ✓ Appoint a safety/waste management officer for each department.
- ✓ Educate staff on the benefits of pollution prevention.
- ✓ Establish pollution prevention goals.
- ✓ Perform pollution prevention assessments.

EMPLOYEE PARTICIPATION

- ✓ “Quality Circles” (free forums between employees and supervisors) can identify ways to reduce waste.
- ✓ Solicit and reward employee suggestions for waste reduction ideas.

PRODUCTION SCHEDULING/PLANNING

- ✓ Maximize batch size to reduce clean-out waste.
- ✓ Dedicate equipment to a single product.
- ✓ Alter batch sequencing to minimize cleaning frequency (light-to-dark batch sequence, for example).

COST ACCOUNTING/ALLOCATION

- ✓ Charge direct and indirect costs of all air, land, and water discharges to specific processes or products.
- ✓ Allocate waste treatment and disposal costs to the operations that generate the waste.
- ✓ Allocate utility costs to specific processes or products.

GENERAL IDEAS FOR ALL BUSINESSES

MATERIAL RECEIVING.

- ✓ Use “Just-in-time” ordering system.
- ✓ Establish a centralized purchasing program.
- ✓ Select quantity and package type to minimize packing waste.
- ✓ Order reagent chemicals in exact amounts.
- ✓ Encourage chemical suppliers to become responsible partners (e.g., accept outdated supplies).
- ✓ Establish an inventory control program to trace chemical from cradle to grave.
- ✓ Rotate chemical stock.
- ✓ Develop a running inventory of unused chemicals for other departments’ use.
- ✓ Inspect material before accepting a shipment.
- ✓ Review material procurement specifications.
- ✓ Validate shelf-life expiration dates.
- ✓ Test effectiveness of outdated material.
- ✓ Eliminate shelf-life requirements for stable compounds.
- ✓ Conduct frequent inventory checks.
- ✓ Properly label all containers.
- ✓ Set up staffed control points to dispense chemicals and collect wastes.
- ✓ Buy pure feeds.
- ✓ Find less critical uses for off-spec material (that would otherwise be disposed).
- ✓ Change to reusable shipping containers.
- ✓ Switch to less hazardous raw material.
- ✓ Use rinsable/recyclable drums.

RAW MATERIAL AND PRODUCT STORAGE

- ✓ Establish spill prevention, control, and countermeasures (SPCC) plans.
- ✓ Use properly designed tanks and vessels only for their intended purposes.
- ✓ Install overflow alarms for all tanks and vessels.
- ✓ Maintain physical integrity of all tanks and vessels.
- ✓ Set up written procedures for all loading/unloading and transfer operations.





- ✓ Install secondary containment areas.
- ✓ Instruct operators to not bypass interlocks or alarms, nor to significantly alter setpoints without authorization.
- ✓ Isolate equipment or process lines that leak or are not in service.
- ✓ Use sealless pumps.
- ✓ Use bellows-seal valves.
- ✓ Document all spillage.
- ✓ Perform overall materials balances and estimate the quantity and dollar value of all losses.
- ✓ Use floating-roof tanks for VOC control.
- ✓ Use conservation vents on fixed-roof tanks.
- ✓ Use vapor recovery systems.
- ✓ Store containers in a way that allows for visual inspection for corrosion and leaks.
- ✓ Stack containers in a way that minimizes the chance of tipping, puncturing, or breaking.
- ✓ Prevent concrete “sweating” by raising the drum off storage pads.
- ✓ Maintain material safety data sheets to ensure correct handling of spills.
- ✓ Provide adequate lighting in the storage area.
- ✓ Maintain a clean, even surface in transportation areas.
- ✓ Keep aisles clear of obstruction.
- ✓ Maintain distance between incompatible chemicals.
- ✓ Maintain distance between different types of chemicals to prevent cross-contamination.
- ✓ Avoid stacking containers against process equipment.
- ✓ Follow manufacturers’ suggestions on the storage and handling of all raw materials.
- ✓ Use proper insulation of electric circuitry and inspect regularly for corrosion and potential sparking.
- ✓ Use large containers for bulk storage whenever possible.
- ✓ Use containers with height-to-diameter ratio equal to one, to minimize wetted area.
- ✓ Empty drums and containers thoroughly before cleaning or disposal.
- ✓ Reuse scrap paper for note pads; recycle paper.

LABORATORIES

- ✓ Use micro or semi-micro analytical techniques.
- ✓ Increase use of instrumentation.
- ✓ Reduce or eliminate the use of highly toxic chemicals in laboratory experiments.
- ✓ Reuse/recycle spent solvents.
- ✓ Recover metal from catalyst.
- ✓ Treat or destroy hazardous waste products as the last step in experiments.
- ✓ Keep individual hazardous waste streams segregated, segregate hazardous waste from nonhazardous waste, segregate recyclable waste from non-recyclable waste.
- ✓ Assure that the identity of all chemicals and wastes is clearly marked on all containers.
- ✓ Investigate mercury recovery and recycling.

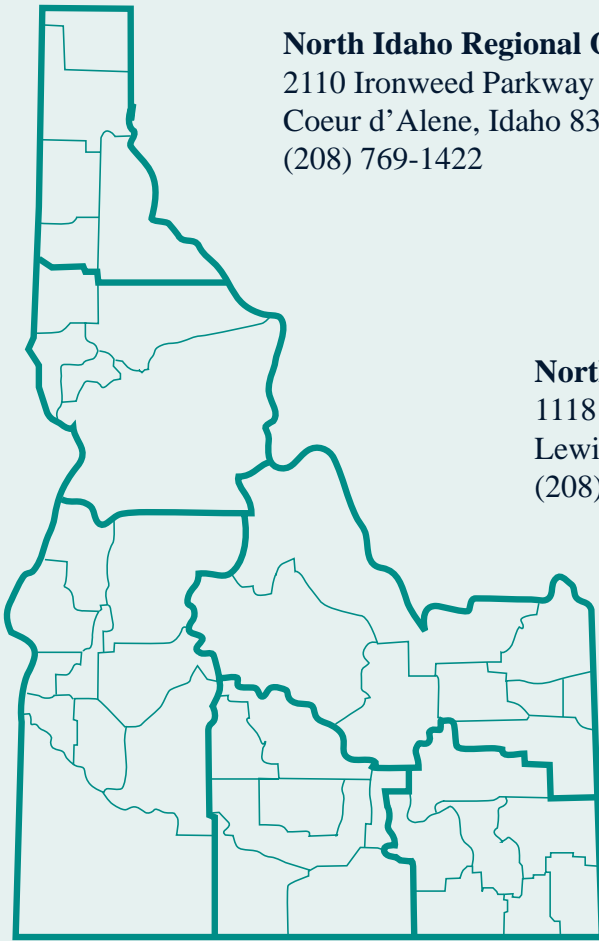
OPERATION AND PROCESS CHANGES

- ✓ Maximize dedication of process equipment.
- ✓ Use squeegees to recover residual fluid on product prior to rinsing.
- ✓ Use closed storage and transfer systems.
- ✓ Provide sufficient drain time for liquids.
- ✓ Line equipment to reduce fluid holdup.
- ✓ Use cleaning systems that avoid or minimize solvents and clean only when needed.
- ✓ Use countercurrent rinsing.
- ✓ Use clean-in-place systems.
- ✓ Clean equipment immediately after use.
- ✓ Reuse cleanup solvent.
- ✓ Reprocess cleanup solvent into useful products.
- ✓ Segregate wastes by solvent type.
- ✓ Standardize solvent usage.
- ✓ Reclaim solvent by distillation.
- ✓ Schedule production to lower cleaning frequency.
- ✓ Use mechanical wipers on mixing tanks.
- ✓ Use smooth heat exchange surfaces.
- ✓ Use high pressure water cleaning to replace chemical cleaning where possible.





DEQ's Pollution Prevention Program • 1410 N. Hilton, Boise, Idaho • (208) 373-0260



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